

Appropriateness of acute medical admissions and length of stay

ABSTRACT – *Objective:* To use the Appropriateness Evaluation Protocol (AEP) to assess the extent of inappropriate utilisation of hospital beds by acute medical patients. To determine whether clinicians viewed the AEP decisions as valid.

Design: Retrospective review of the medical records of a 10% random sample of 8,210 patients admitted as medical emergencies. An objective independent review instrument (AEP) was used to assess the medical necessity for hospitalisation at admission and on each subsequent day. To test the validity of the screening instrument, a subsample of the reviewed records was further assessed by a panel of physicians.

Setting: A district general hospital in the West Midlands region of England.

Subjects: Eight hundred and twenty-one adult patients admitted to general medicine during one calendar year.

Main outcome measures: Proportions of admissions and days of care for which inpatient medical care was judged appropriate. Reasons for inappropriate utilisation and potential bed-days that could be saved by the development and use of alternative services were also considered. Validity of the AEP was tested by assessing agreement between the majority decision of an expert panel and the criterion-based AEP decision.

Results: AEP identified 51/821 (6%) admissions and 2,195/4,885 (45%) days of care as inappropriate. Over half the patients had a hospital stay in which at least half the days were judged inappropriate. The commonest reason for inappropriate days was remaining in hospital after the medical purpose for admission had been accomplished. This accounted for 38% of inappropriate days reviewed. In validity testing there was a high level of agreement between the physicians and the AEP, with kappa values greater than 0.80 for admissions and days of care.

Conclusions: The AEP is a valid and useful instrument for assessing the utilisation of acute medical beds in a NHS hospital. In this study acute medical admissions were largely appropriate at the time of admission but a

substantial proportion of subsequent days of care was considered inappropriate by AEP criteria. Most inappropriate utilisation was due to organisational issues within the hospital. As a result of this study, several service and policy developments were identified that should improve the efficiency of bed utilisation at the hospital.

In 1991 an action group reviewed the utilisation of medical beds in the North Staffordshire Hospital Centre. The group highlighted the enormous pressures on acute medical beds and the knock-on effects of medical outliers nursed on surgical wards preventing admissions for elective surgery. It recognised that a proportion of patients was being admitted inappropriately for tests and investigations that could have been performed outside hospital. Other patients remained in hospital longer than was necessary for treatment of their illness and the group felt that these patients could be equally well managed at home or in a less costly setting such as a nursing home. Many of these local problems and concerns also featured in the Audit Commission report on the use of medical beds in acute hospitals¹. The Commission advocated examination of the length of stay in hospital for specific diagnoses as a way of detecting inappropriate use but this method has a number of limitations. First, the relationship between length of stay and appropriateness is not clear cut. Patients with short or average length of stay can be inappropriately admitted or have stays that are unnecessarily long, even though they lie within the 'acceptable' range for the condition. Furthermore, length of stay profiles are highly dependent on accurate coding and are vulnerable to incorrect diagnosis.

Rising health care expenditure in the United States has led to the development of methods to assess the health care process and the appropriateness of both the site and duration of care. The Appropriateness Evaluation Protocol (AEP) was developed during the 1970s to provide an objective criterion-based assessment of the medical appropriateness of admissions and subsequent days of care². It is a generic (diagnosis independent) review instrument and can therefore be used even when the diagnosis is uncertain or incorrect. The AEP considers the intensity of nursing and types of treatment ordered for the patient and the clinical characteristics of the patient as assessed by history, examination and laboratory investigations. The AEP has one set of criteria to determine the medical necessity (appropriateness) of admissions and another set for subsequent days of care. If any one of the criteria is met, the admission or day of care is

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classified as appropriate; if no criteria are met, then the admission or day of care is deemed inappropriate. When an admission or day of care is found to be inappropriate, the probable cause of inappropriateness is classified using the AEP reasons list. The developers of the AEP have reported good reliability of the instrument³ and the AEP has been demonstrated to be valid in independent evaluation in North America⁴. However, the AEP has never been validated for use in the UK. As medical practice varies among countries, local validation is essential because the application of an invalid screening instrument could adversely affect the quality of patient care by inappropriately discouraging hospitalisation.

The goals of this study were to quantify the patterns of inappropriate medical bed utilisation in a busy district hospital and to assess the usefulness and validity of the AEP in a NHS facility.

Methods

Utilisation review

We took a random 10% sample of all acute medical admissions to the North Staffordshire Hospital during the calendar year 1992. The sample was stratified by season. A trained auditor (LH) reviewed the hospital notes retrospectively, using the AEP criteria without the override facility. The review included the medical records, laboratory results, drug charts, nursing, therapy and social worker notes, together with demographic details (age, gender, area of residence), details of hospitalisation (ward, specialty, consultant) and clinical details (diagnosis, procedures). Data were collected on a structured proforma and entered onto a microcomputer for statistical analysis using SPSS/PC⁵.

Validity testing of AEP

The judgements of the AEP utilisation review instrument were compared with the majority judgement of a panel of six clinicians. They were experienced physicians (three consultant general physicians, one consultant geriatrician, one associate specialist and one senior registrar) involved in supervising the acute medical intake. A sample of 40 patients was taken from the main study. To facilitate simultaneous review, sections of the medical record relevant to the admission or day of care were photocopied, anonymised and circulated. Each case was reviewed independently by three physicians who evaluated the medical necessity of the admission and of a specified day of care. They were not given explicit criteria to guide their judgement and were blinded to the result of the AEP review. If the physicians considered that the patient did not require hospitalisation in an acute care facility for the investigations or treatment proposed, they were asked to identify an alternative setting in which these

services could be provided and the additional services or resources for such a service locally. In analysing the results of these reviews, the majority opinion (2/3 or 3/3) was taken as the operational definition of appropriateness and this was compared with the AEP judgement. The cases where there was discrepancy between the majority opinion and the screening instrument were discussed by the panels at a meeting with the research team. Four measures were used to assess validity: overall agreement, specific inappropriate agreement, the inappropriate estimation ratio, and Cohen's kappa statistic⁶. Kappa is a measure of agreement that incorporates a correction for the extent of agreement expected by chance. A kappa value greater than 0.75 represents excellent agreement, values below 0.4 poor agreement and values between 0.4 and 0.75 may be taken to represent fair to good agreement beyond chance⁷.

Results

The 10% random sample of acute admissions consisted of 821 patients (53% male) whose ages ranged from 15 to 95 years (median age 71). The median length of stay was 6 days (range 1–69 days); 59% had been referred by the general practitioner and 36% were admitted via the accident and emergency department; the remainder came from outpatients or were transferred from other hospitals. The most common primary diagnoses were ischaemic heart disease (13%), chronic obstructive airways disease (10%), other forms of heart disease (10%) and cerebrovascular disease (8%); 13.6% of patients died in hospital.

Appropriateness of admissions

Of the 821 admissions, 770 (93.8%; 95% confidence interval (CI) 92.1–95.4%) were judged by the AEP to be appropriate and 51 (6.2%; 95% CI 4.6–7.9%) inappropriate. There were no significant differences in the level of appropriateness between male and female patients or between patients of differing ages; nor were there any significant differences according to the season, day of the week or the time of day of the admission. Patients whose admission was appropriate stayed in hospital longer (median length of stay 6 days) than those inappropriately admitted (4 days) ($p = 0.046$).

Reasons for inappropriate admission

The commonest reason for inappropriate admission was that the investigations or treatments proposed could have been organised on an outpatient basis (42/51 cases) (82.4%; 95% CI 71.9–92.8%). The remaining nine (18.6%) inappropriate admissions, could have been managed in a less intensive setting such as a nursing home or a home for the elderly.

Appropriateness of hospital stay

Of the total of 4,885 days of hospital care assessed, 2,690 (55%; 95% CI 53.7–56.5%) were judged to be appropriate by the AEP; the remaining 2,195 (45%; 95% CI 56.5–63.9%) days of care were judged inappropriate. Of the 668 patients whose length of stay was greater than 2 days, the penultimate day of stay was judged to be inappropriate in 60% (402/668). Every day was judged appropriate by the AEP criteria for 10.6% of patients, at least half of the stay was judged appropriate for 51.6%, and only 6.5% of patients had a hospital stay during which less than 10% of their days of care were deemed appropriate. When the days of stay subsequent to patients' inappropriate admission were considered separately, over 80% had an entirely inappropriate stay. Only 4/51 of these patients

(7.8%) had at least half of their stay classified as appropriate compared with 420/770 (54.5%) of those patients who had been appropriately admitted (Table 1).

Reasons for inappropriate days of care

Delay in performing the investigations or treatment required before discharge caused 461/2,195 (21%; 95% CI 19.3–22.7%) inappropriate days of care. This delay was variously due to difficulty in scheduling the investigation, delay in reporting results, or delay in the interpretation of the results by the clinician caring for the patient. The commonest reason for inappropriate days of care was patients remaining in hospital after the medical purpose of hospitalisation had been accomplished (Table 2).

Table 1. Proportion of inappropriate days of stay for all patients and for those patients judged to have been admitted appropriately or inappropriately.

Inappropriateness ratio	All admissions (n = 821)		Inappropriate admissions (n = 51)		Appropriate admissions (n = 770)	
	Frequency	%	Frequency	%	Frequency	%
0.0–	87	10.6	0	0.0	87	11.3
0.1–	84	10.2	0	0.0	84	10.9
0.2–	100	12.2	2	3.9	98	12.7
0.3–	105	12.8	1	2.0	104	13.5
0.4–	48	5.8	1	2.0	47	6.1
0.5–	167	20.3	2	3.9	165	21.4
0.6–	83	10.1	0	0.0	83	10.8
0.7–	52	6.3	2	3.9	50	6.5
0.8–	42	5.1	2	3.9	40	5.2
0.9–	53	6.5	41	80.4	12	1.6

Inappropriateness ratio for each patient stay = number of days judged inappropriate/total number of days stayed in hospital.

Table 2. Reasons for each inappropriate day of care (n = 2,195).

Reason	n	%	95% CI (%)
<i>Delay in completing the treatment for which patient hospitalised</i>			
Problem in scheduling procedure	134	6.1	5.1– 7.1
Awaiting results or consultation	327	14.9	13.4–16.4
<i>Purpose of hospitalisation accomplished</i>			
Failure to initiate prompt discharge planning	290	13.2	11.8–14.6
No documented plan for further treatment	831	37.9	35.8–39.9
Suitable for outpatients	254	11.6	10.2–12.9
Family unable/unwilling to care	10	0.5	0.2– 0.7
Awaiting lower level of care facility	229	10.4	9.2–11.7
Awaiting domiciliary service	51	2.3	1.7– 3.0
Awaiting modification of home environment	69	3.1	2.4– 3.9

Validity of the AEP

There was agreement between the AEP and the panel of physicians in 37/40 (93%) of the admissions reviewed and 38/40 (95%) of the days of care reviewed. Kappa values of 0.83 for admissions and 0.90 for days of care represent excellent agreement beyond chance between the AEP decision and the majority view of the clinician reviewers⁷ (Table 3).

Discussion

This study has shown the AEP to be a useful and valid instrument to review appropriateness of adult medical patients in a busy NHS district general hospital. Acute medical admissions were found to be largely appropriate at the time of admission but a substantial proportion of the subsequent days of care were judged inappropriate on AEP criteria. Most of the inappropriate utilisation of hospital resources was due to the clinicians' practices or organisational issues within the hospital.

In this independent evaluation, the AEP demonstrated good validity when compared with unstructured judgements by physicians as a reference standard. The results of this assessment compare favourably with those reported in a US evaluation of the adult AEP⁴. The AEP and the panel of clinicians disagreed on the appropriateness of three admissions. Two cases were judged inappropriate by the AEP but regarded as 'reasonable and normal clinical practice' by the panel. One case was a frail elderly person with a long-standing neuropathy and acute chest infection who had failed to improve on treatment initiated by the general practitioner. His treatment remained unchanged after admission and no AEP criteria were met. The second was a middle-aged patient with syringomyelia who had chest discomfort and difficulty breathing since falling the previous day; chest radiography demonstrated a basal pleural effusion but no action was taken. In both cases the physicians considered that admission was justified because the patient might have deteriorated and would then have required an urgent hospital-based intervention.

The admission classified as appropriate by the AEP but inappropriate by the clinicians was a patient with a possible pulmonary embolus. The AEP accepted the admission as appropriate because intravenous heparin was given but the clinicians felt that same day access to a ventilation perfusion scan could have prevented admission.

Turning to the days of care, one disagreement hinged on this subtle but important difference between the inappropriateness of hospitalisation and the inappropriateness of treatment. The physicians considered that a patient who had sustained a cerebrovascular accident had been overtreated and that continued detention in an acute setting had been inappropriate, whereas if the management plan had

Table 3. Validity of AEP for admissions and days of care.

Admissions (n = 40)	
Overall agreement	93%
Specific inappropriate agreement*	80%
Inappropriate estimation ratio†	0.93
Cohen's kappa	0.83
95% confidence interval of kappa	0.65–1.00
Days of care (n = 40)	
Overall agreement	95%
Specific inappropriate agreement	91%
Inappropriate estimation ratio	1.10
Cohen's kappa	0.90
95% confidence interval of kappa	0.76–1.00

Tested by comparing AEP decision in 40 admissions and 40 days of care with the majority opinion of panels of three clinicians. Agreement was assessed with strict application of the AEP criteria, without using the override facility.

* Specific inappropriate agreement is defined as the proportion of admissions (or days of care) rated as being inappropriate by both the AEP and the clinician panel over the total number of admissions (or days of care) deemed inappropriate by either the AEP, the panel or both.

† Inappropriate estimation ratio is the ratio of the number of cases deemed inappropriate by the instrument to the number of cases deemed inappropriate by the panel.

been accepted as appropriate, then the days of care would also have been justified. The AEP assumes that the clinical diagnosis and management plan are correct and then judges whether the severity of symptoms and intensity of services ordered necessitate continued hospitalisation. The AEP is not concerned with whether the services ordered are really needed and thus does not detect unnecessary medical or surgical treatment based on misdiagnosis or over-zealous management.

An inappropriate admission rate of 6% compares well with that reported in North American studies. There are few published estimates of inappropriate utilisation in the UK. In one study, up to 20% of medical and geriatric admissions were reported as inappropriate⁸, and in another, 11% of geriatric admissions were inappropriate⁹. Estimates of inappropriate days of care range from 15% to 62%^{10,11}. Inappropriateness rates appear to rise with proximity to day of discharge: 66% inappropriateness has been reported in the 24 hours of care preceding discharge¹². Some caution is needed in the comparison and extrapolation of these results. In particular, differences in the sampling method and in the mode of application of utilisation criteria make it difficult to compare the studies¹³.

A high proportion of inappropriate utilisation was due to factors within the control of the hospital. Extrapolating from our study, there is the theoretical

potential of saving up to 16,500 bed-days per annum. Easier availability of investigations, more rapid reporting of results and prompter management decisions could contribute 4,000 bed-days, while 10,000 bed-days could be saved by better discharge planning and 2,500 bed-days by wider use of outpatient services for investigation or treatment of medical patients. It is much more difficult to influence inappropriate days of care that arise because of social circumstances or inadequacies in community services, but these contributed a minority of inappropriate days of care.

The AEP estimates the extent to which inappropriate utilisation is avoidable but does not address the feasibility, practicality and cost of providing care in another setting. In some cases, limiting misutilisation may cost the health care system more than the inappropriate days themselves. For example, the transfer of convalescent patients to a lower level of care might cost more than the savings accrued where such a facility was not already available and had to be built. Another limitation of the utilisation review includes insensitivity to social need. Utilisation review criteria ignore the social reasons for hospitalisation and ruthless adherence to criteria may disregard urgent social needs. Some medically inappropriate stays may be justified and unavoidable on social grounds.

Utilisation review cannot identify under-utilisation or unserved need because it focuses on patients who are already in contact with health services and are receiving inpatient care. Its aim is to reduce both the volume and duration of hospitalisation. But downward pressure on inpatient hospitalisation may lead to a commensurate growth in the use of outpatient and community services, areas for which utilisation review instruments have not yet been developed.

This utilisation review produced findings of interest to both clinicians and managers and has influenced service developments. After presentation of the study to our Trust and Management Boards, as well as the clinical members of the medical directorate, the emphasis on service improvements was changed from the admissions unit to the wards. The structure of care for medical inpatients has been revised so that a clinical team is attached to each ward. Bottlenecks in both scheduling diagnostic procedures and reporting the results were identified and discharge policies reviewed. The review, using the AEP, will be repeated in the 1997/98 audit programme.

The AEP review procedure was quickly mastered. Practical difficulties in using the AEP were encountered at two stages. Notes were frequently unavailable at the time of extraction from file and were sometimes recalled for current inpatient or outpatient consultations. Where they were available, extracting the relevant information was more time-consuming than we had expected. There were difficulties deciphering clinicians' handwriting and in locating the relevant charts, which were all filed together in the notes but not in date order. We later found that these problems

can be overcome by concurrent review, that is review whilst the patient is still an inpatient.

The AEP does have a facility for the reviewer to override the criterion-based assessment in either direction if he or she feels that the AEP judgement does not accurately capture the clinical situation of the patient. However, we decided that in this study the AEP criteria should be applied without the use of the override facility. This was, first, because our reviewer did not have a clinical background, and secondly, because the override facility reduces the objectivity of the review process, a weakness recognised by the developers of the AEP themselves¹⁴.

At a time when NHS hospitals are facing a rising tide of admissions and increasing pressure on their resources, utilisation review with a validated instrument such as the AEP offers a useful method of monitoring the appropriateness of adult medical admissions. From our experience, most acute medical admissions are appropriate at the time of admission but a substantial proportion of the subsequent days of care is inappropriate on AEP criteria. Utilisation review makes it possible to quantify the potential benefits of service developments such as improving the availability of investigations, rapid reporting of results, enhancing discharge planning and increasing the use of outpatient services for investigation or treatment of medical patients.

Acknowledgements

We wish to thank the physicians of the medical directorate, North Staffordshire Hospital NHS Trust, for allowing us to review their notes; Dr Anthony Frew for critical review of the manuscript; Nigel Baker for statistical advice. We are particularly grateful to the six members of the clinician panel for their time and judgements.

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NEW
TITLE

Improving care for patients with malignant cerebral glioma

Edited by Elizabeth Davies and Anthony Hopkins

Malignant cerebral glioma is an uncommon but devastating cancer. The prognosis for these patients is poor and the median survival is less than one year. Patients face physical, cognitive and psychological problems affecting the quality of their life, and these in turn affect their relatives or carers. So far, however, little attention has been given to the specific needs of these patients and how services may be developed that best suit their needs.

This book sets out the evidence for best surgery, radiotherapy and chemotherapy treatment. Other topics include the breaking of bad news, the experiences and views of patients and their relatives on their care, the role of the specialist nurse in follow-up and support, and palliative care in the community. There is also advice on how treatment centres and palliative care settings can evaluate their care and the issues that health authorities purchasing care may wish to consider.

Audit proformas for good practice in the management of the disease, along with instructions for their use are grouped in an appendix.

The care of patients with malignant cerebral glioma raises a variety of challenges for health services. An essential goal, however, must be to achieve palliation of symptoms and to support the patient and his or her family. This book suggests many topics that clinicians caring for patients in treatment centres and elsewhere may like to consider in the development of their service.

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Appendix — Proformas for the audit of the management of adults with malignant cerebral glioma

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